

and we think there can be no doubt of its ultimate complete success. The Marquis of Ripon spoke cheerfully both of the present and future of the college, and gave the students some excellent advice as to the aims they should set before them in pursuing their studies.

On the same day a similar ceremony was held at Owens College, Manchester, when much surprise was expressed that the Yorkshire College should oppose the Manchester University scheme. † There need be no surprise at this, though we think that, if the two institutions thought of nothing but the educational welfare of the north of England, they would not find it so difficult to see eye to eye.

The Kirgis tribes of Siberia have contributed about 3,000*l.* to the university of Kasan, to serve as a fund for stipends for Kirgis students.

The continued existence of duels in the German universities is a sad blot on modern Teutonic civilisation. Within the past few weeks two deaths from pistol duels have occurred at the universities of Erlangen and Pest.

SCIENTIFIC SERIALS

Annalen der Physik und Chemie, Ergänzung Band viii. Stück 4.—In an inaugural dissertation, with which this number opens, Dr. Less investigates the heat conductivity of some seventeen varieties of stone, and several kinds of wood, his method being a refinement on that of Hopkins, with whose results (for stone) his own generally agree, only the numbers obtained for different varieties of one rock vary much more. In general, density and compactness favour the passage of heat, though the effect evidently does not depend on this alone. Stones of crystalline texture conduct better than those mechanically mixed, and fine-grained better than coarse-grained stones. In his table, marble from the Pyrenees is put at the top, its conductivity being reckoned 1,000; then follow Saxon granite (804), Carraran marble (769), &c., down to common clay (275). Tyndall's observation of a difference in conduction in two directions (with and at right angles to the fibres) in wood is confirmed, but the differences are found considerably less. The ratios of the galvanometer deflections are much greater in the better-conducting than in the worse-conducting woods, making it very probable that these deflections are proportional, not to the conductivities themselves, but to a somewhat higher power of them.—In two papers dealing with magnetic induction and Clausius and Weber's fundamental laws of electro-dynamics, M. Lorberg, by a development of the theory of two experiments, arrives at results throwing doubt on Clausius' law, and endeavours to show that Weber's is the only possible one.—M. Sadebeck contributes a lengthy paper on the crystallisation of markasite, and its regular growths with iron pyrites; and M. Schön describes the absorption of light by water, petroleum, ammonia, alcohol, and glycerine.

Bulletin de l'Académie Royale de Belgique, No. 3, 1878.—In this number MM. Navez further describe their new system of telephony, by which they claim to speak at distances which are beyond the power of Bell's instruments, with an intensity equal to that of persons speaking face to face. The sender is a modified form of Edison's. A steel bar, supported in a tube, rests vertically on some rundles of retort carbon on the plate, which is copper covered with silver, and to which the sound of the voice passes through a tube of vulcanised caoutchouc attached below; bar and plate are of course in circuit, as also an induction coil. The plate is pinched between hardened caoutchouc and mahogany, which latter supports, on rundles of caoutchouc, a zinc disc with central tube for the steel bar.—Reviewing the geographical distribution of Balænoptæ, M. van Beneden shows that we cannot consider any of the four species of Balænoptæ and the one Megaptera, frequenting the North Atlantic, as proper to Europe. They all, or nearly all, visit the east coasts of North America, as well as the west coasts of Europe, and proceed, both eastwards and westwards, into the Pacific. The North Atlantic species have all representatives in the North Pacific, and *Rachianectes* alone has no representative beyond the Pacific.—Among other zoological papers M. Fraipont furnishes the second and third portions of his researches on the Actinians of the Ostend coast (three of the forms described are new to science), and M. Longchamps makes additions to the synopsis of the Cordulinae.—In an interesting memoir reported on by MM. van der Mensbrugghe and Folie,

M. Lagrange concludes that a deformable mass, subjected to the attraction of another deformable mass, in rotation takes a motion of rotation in the same direction, which result he proposes to apply to explain the origin and establishment of astronomical movements.

Bulletin of the United States Geological and Geographical Survey of the Territories, vol. iv. No. 2, Washington, May, 1878, contains the following articles:—The geographical distribution of the mammalia considered in relation to the principal ontological regions of the earth and the laws that govern the distribution of animal life, by J. A. Allen.—Descriptions of new extinct vertebrata from the upper tertiary and Dakota formations, by E. D. Cope (describes a large number of new reptile, bird, and mammalian forms).—Notes on a collection of fishes from the Rio Grande at Brownsville, Texas, and a catalogue of the freshwater fishes of North America, by Dr. D. Jordan.—Description of a fossil passerine bird from the insect-bearing shales of Colorado, by J. A. Allen, with a plate.—The coleoptera of the Alpine regions of the Rocky Mountains, by Dr. J. L. Le Conte.—On the orthoptera of Dakota and Montana, by Prof. Cy. Thomas.—On the hemiptera of the same, by P. R. Uhler.—On the lepidoptera of Montana, by W. H. Edwards.—On some insects of unusual interest from the tertiary rocks of Colorado and Wyoming, by S. H. Scudder.

Schriften der physikalisch ökonomischen Gesellschaft zu Königsberg (1876, Nos. 1 and 2, and 1877, No. 1).—These parts, besides a large number of smaller papers and notes, contain the following more important treatises:—On the flora of the great Werder, near Marienberg, by I. Preuschhoff.—Report on the recent excavations at Tengen, near Brandenburg (Natangen), by R. Klebs.—On the mechanical principle of equal temperatures in the bodies of the higher animals, by Dr. A. Adamkiewicz.—On some remains of extinct buffalo species from the province of Prussia, by Dr. Jentzsch.—On the decrease in the quantity of water in the rivers of cultivated countries, by Dr. Krosta.—On archaeological museums, by O. Tischler.—On some physical relations between the human and animal organism and anorganic nature, by Prof. Grünhagen.—On the latest improvements in the photographic pigment printing process, by Dr. Benecke.—On some antiquities from Claussen, by Dr. Jentzsch.—On the latest discoveries in the diluvial fauna of East Prussia, by the same.—On the strata containing amber in the so-called Samland, by Herr Marcinowski.—On the formation of amber, by Dr. Jentzsch.—On the geognostical investigation of the province of Prussia during the year 1876, by the same.—On the *Macro-lepidoptera* of the province of Prussia, by Rob. Grentzenberg.—On the distribution of rain over the year 1876, by Dr. Schieffelderdecker.—On truffles, by Dr. Caspary.—On the great Indian census of 1872, by Dr. Wagner.—Speech in memory of the late Dr. K. E. von Baer, by Prof. Zaddach.—On a naval chart from the fourteenth century, by Dr. Jentzsch.—Full reports of the meetings of the Prussian Botanical Society of Königsberg.—Craniological researches, by Dr. Kupffer.—On a map of the world dating from the year 1452, by Dr. Jentzsch.—On the retina purple, by Dr. von Wittich.—New researches on the habits of ants, Dr. Gwalina.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 16.—“On the Variations of the Diurnal Range of the Magnetic Declination as Recorded at the Prague Observatory,” by Balfour Stewart, LL.D., F.R.S., Professor of Natural Philosophy at Owens College, Manchester.

The Prague observations began in July, 1839, and have been continued until the present date. They have been dealt with in the same way as those of Kew and Trevandrum. In the first place a set of nine-monthly values of declination range has been obtained corresponding to similar nine-monthly values of spotted solar area. When these are graphically plotted it is found that a number of points in the sun-spot curves may be fairly identified as corresponding to certain points in the declination-range curve, but that the latter invariably lag behind the former in time.

This will be seen from the following table, in which the epochs of maximum and minimum sun-spots are compared with those of declination-range:—

Solar min., June 15, 1843	Prague, dec.-range, min., Feb. 28, 1844.
Solar max., Dec. 15, 1847	Prague, dec.-range, max., March 31, 1848.
Solar min., Sept. 15, 1855	Prague, dec.-range, min., March 31, 1856.
	Trevandrum, dec.-range, min., Feb. 15, 1856.
Solar max., Nov. 15, 1859	Kew, dec.-range, max., April 15, 1860.
	Trevandrum, dec.-range, max., May 15, 1860.
Solar min., March 15, 1867	Kew, dec.-range, min., August 15, 1867.

In the next place variations are found in the declination range at Prague which appear to depend on planetary configurations, and which are similar in character to those found at Kew and Trevandrum.

An inspection of the sun-spot records reveals the fact that at times of maximum spot frequency, not only are there most spots on the sun, but that the sun-spot inequalities or oscillations (however produced) are at such times much more prominent than during times of minimum sun-spot frequency. Now, if it be true that these spot periods are due in a great measure, if not entirely, to planetary configurations, we might expect that (possibly from an increase in the susceptibility of the sun) the planetary periods should at times of maximum sun-spots be found to be greater than their average value.

This is found as a matter of fact to be the case, as will be seen from the following table, comparing together observed sun-spot planetary inequalities for periods of maximum sun-spots with the corresponding mean inequalities:—

				Period of Mercury.	
				Observed.	Mean.
Between	0	and	30	- 2'31	- 3'95
"	30	"	60	- 20'85	- 10'63
"	60	"	90	- 33'07	- 12'10
"	90	"	120	- 40'37	- 12'33
"	120	"	150	- 37'50	- 11'96
"	150	"	180	- 21'30	- 10'13
"	180	"	210	- 2'04	- 5'83
"	210	"	240	+ 18'29	+ 1'54
"	240	"	270	+ 37'09	+ 6'99
"	270	"	300	+ 47'73	+ 10'00
"	300	"	330	+ 43'55	+ 8'91
"	330	"	360	+ 22'22	+ 3'63
				Mercury and Jupiter together.	
				Observed.	Mean.
Between	0	and	30	- 5'76	- 3'22
"	30	"	60	- 18'95	- 7'56
"	60	"	90	- 33'26	- 11'72
"	90	"	120	- 43'66	- 13'11
"	120	"	150	- 37'91	- 10'91
"	150	"	180	- 27'22	- 8'71
"	180	"	210	- 11'24	- 4'84
"	210	"	240	+ 10'78	+ 0'73
"	240	"	270	+ 27'76	+ 5'45
"	270	"	300	+ 37'35	+ 8'33
"	300	"	330	+ 35'33	+ 7'29
"	330	"	360	+ 16'62	+ 2'41

If we now turn to declination-ranges we shall find that there are greater oscillations or sub-periods in the value of these ranges during times of maximum than during times of minimum sun-spots. But on the other hand the increased value of such oscillations is by no means so striking as in the case of sun-spots. Mr. Broun has already made the remark that while there is an increase in the whole declination-range during times of maximum sun-spots, yet this increase is not so marked as in the case of the spots themselves, inasmuch as we have a considerable declination-range when there are no spots on the sun. From what has now been said it would seem that a similar remark applies to the oscillations or sub-periods of declination-range, which, while increasing from times of minimum to times of maximum sun-spots, do not yet increase so strikingly as the oscillations or sub-periods of the spots themselves.

If we now treat the inequalities of magnetic declination that appear to depend on the two most available planetary configurations in the manner in which we have just treated sun-spot inequalities, we might expect the observed magnetic inequalities corresponding to times of maximum sun-spots to be greater than

the mean inequalities, but not to the same extent as in the case of sun-spots.

That this is the case will be seen from the following table, in which observed declination-range, planetary inequalities for periods of maximum sun-spots are compared with the corresponding mean inequalities:—

				Period of Mercury.	
				Observed.	Mean.
Between	0	and	30	+ 11'48	+ 10'42
"	30	"	60	+ 3'62	+ 7'25
"	60	"	90	- 3'50	- 2'25
"	90	"	120	- 6'91	- 3'25
"	120	"	150	- 9'13	- 8'16
"	150	"	180	- 12'37	- 11'67
"	180	"	210	- 13'72	- 12'12
"	210	"	240	- 10'44	- 8'68
"	240	"	270	- 2'45	- 2'62
"	270	"	300	+ 7'73	+ 4'10
"	300	"	330	+ 15'14	+ 9'26
"	330	"	360	+ 16'20	+ 11'27

				Mercury and Jupiter together.	
				Observed.	Mean.
Between	0	and	30	+ 11'87	+ 11'61
"	30	"	60	+ 2'56	+ 8'07
"	60	"	90	- 4'26	+ 2'75
"	90	"	120	- 8'72	- 2'45
"	120	"	150	- 13'85	- 7'93
"	150	"	180	- 16'24	- 11'97
"	180	"	210	- 13'44	- 11'80
"	210	"	240	- 8'32	- 8'71
"	240	"	270	+ 0'51	- 3'11
"	270	"	300	+ 11'39	+ 3'44
"	300	"	330	+ 16'91	+ 8'74
"	330	"	360	+ 17'06	+ 11'89

It thus appears that in the case of the magnetic declination periods there is (as in those of sun-spots) an exaltation of the observed over the mean values during times of maximum sun-spot frequency, but this exaltation is not so marked as in the case of sun-spots. Now, without pretending to know in what way the sun influences the magnetism of the earth, we may imagine that the increased values not only of the average declination-range but also of the sub-periods of these during times of maximum sun-spots may be due to one of two causes, or to both of these together. Thus we may imagine that the sun has an increased magnetic influence during such periods, or we may imagine that there is an increase in the magnetic susceptibility of the earth; or, finally, we may imagine that both of these causes operate together. The author cannot help thinking that we have some evidence of an increase of the magnetic susceptibility of the earth on such occasions derived from two facts discovered by Mr. Broun. The one is that the magnetic influence of the moon on the earth shows traces of following the solar period, this influence being greater during times of maximum than during times of minimum sun-spots. The other is that at Trevandrum the lunar magnetic influence, without changing its type, exhibits an increase of value when the sun is above the horizon at that place, as if on such occasions there were an increase of susceptibility to the lunar influence. These, however, are points which can only be determined by a further discussion of observations.

Geological Society, May 22.—Henry Clifton Sorby, F.R.S., president, in the chair.—John Collins was elected a Fellow of the Society.—The following communications were read:—On the serpentine and associated igneous rocks of the Ayrshire coast, by Prof. T. G. Bonney, M.A.—In a paper published in the *Quarterly Journal of the Geological Society*, vol. xxii. p. 513, Mr. J. Geikie states that the rocks of this district are of sedimentary origin, a felspar-porphry being the "maximum stage of metamorphosis exhibited by the felspathic rocks," and the diorite, hypersthene, and serpentine being all the result of metamorphism of bedded rocks. This view is also asserted in the catalogue of the rocks collected by the Geological Survey of Scotland. The author had seen specimens of rocks from this district which so closely resembled some from the Lizard, that he visited the Ayrshire coast in the summer of 1877. The author is of opinion that the principal conclusions of the paper referred to above are not warranted by either stratigraphical or lithological evidence. He considers it probable that the "felspar-porphry," like so much of that in Scotland, is of old red sandstone age, and that the serpentine is of later date,

but palæozoic.—On the metamorphic and overlying rocks in the neighbourhood of Loch Maree, Ross-shire, by Henry Hicks, M.D., F.G.S. The rocks in the neighbourhood of Loch Maree have been described by various authors, but chiefly and most recently in papers communicated to the Geological Society by Prof. Nicol, of Aberdeen, and by Sir R. Murchison and Prof. Geikie, of Edinburgh. In the present communication the author endeavours to show, from results obtained by him recently by a careful examination of a section extending from Loch Maree to Ben Fyn, near Auchnasheen, that the interpretations previously given are in some important points incorrect, and that this has been to a great extent the cause of such very diverse opinions.—On the triassic rocks of Normandy and their environments, by W. A. E. Ussher, Esq., F.G.S.—On foyaites, an æcolitic syenite occurring in Portugal, by C. P. Sheibner, Ph.D., F.G.S. Communicated by Prof. T. McKenny Hughes, M.A., F.G.S.

Zoological Society, June 4.—Prof. Flower, F.R.S., vice-president, in the chair.—Mr. Slater exhibited a young specimen of Temminck's Manis (*Manis temminckii*), and read a note describing habits of this animal in captivity by Mr. F. Holmwood, Assistant Political Agent at Zanzibar.—Mr. Slater also called attention to the extraordinary mimicry of the true rectrices by the elongated upper tail coverts in *Ciconia maguari* and *C. episcopus*, as observable in the living examples of these birds in the Society's Gardens.—Mr. Edward R. Alston exhibited, on behalf of Dr. Elliott Coues, two specimens of *Synaptomys cooperi*. To this species—the type of *Synaptomys*, proposed in 1867 by Prof. Baird as a sub-genus of *Myodes*—full generic rank was accorded by Dr. Coues in 1874. The present specimens were, so far as was known, the first typical specimens sent to Europe.—Prof. Huxley, F.R.S., read a memoir on the cray-fishes, in which he gave a review of the various generic divisions of this group of podophthalmous crustacea, and pointed out how remarkably these divisions corresponded with their geographical distribution.—Prof. W. H. Flower, F.R.S., exhibited the skull of a two-horned rhinoceros from Tipperah, and read a note on the peculiarities of its structure.—A communication was read from Messrs. Godman, Salvin, and Druce, containing a catalogue of the lepidoptera collected by Mr. S. N. Walter in the Island of Billiton.—Messrs. Godman and Salvin also read a list of the butterflies collected in Eastern New Guinea and some neighbouring islands by Dr. Comrie, during the voyage of H.M.S. *Basilisk*.—Mr. A. G. Butler, F.Z.S., read a paper containing the description of a new species of the orthopterous genus *Phylloptera*, from Madagascar, which he proposed to name *Phylloptera segonoides*.—Messrs. Slater and Salvin read a report on the collection of birds made during the voyage of H.M.S. *Challenger*. The present communication, forming the eleventh of the series, contained a description of the Steganopodes and of the Impennes. Of the first group the collection contained thirty-three specimens belonging to eight species; of the second, thirty-seven specimens belonging to six species.—Prof. E. Ray Lankester read a paper in which he gave an account of the structure of the hearts of *Ceratodus*, *Protopterus*, and *Chimera*, with an account of certain undescribed pocket-valves in the conus arteriosus of *Ceratodus* and of *Protopterus*.

Institution of Civil Engineers, May 28.—Mr. John Frederic Bateman, F.R.S., president, in the chair.—The discussion on Mr. T. C. Clarke's paper on the design of iron railway bridges of very large spans, was continued throughout the evening.

ROME

R. Accademia dei Lincei, April 7, 1878.—The following among other papers were read :—Human skeleton in a cavern of the Arena Candida, near Finalmarina, by M. de Sanctis.—Palæontological notes on a large fossil humerus of a bear and other bones of a stag, from a cave near Poggio Mojano, by M. Ponzi.—New researches on Fourier's series, by M. Ascoli.—On carbottaldina and some other sulphurised compounds, by M. Guareschi.—On some derivatives of tetrachlorated ethers, by M. Paterno.—On new derivatives of santonines, by M. Valenti.—On secular variations of the magnetic declination at Rome, by M. Kella.—Map of the planet Mars, by M. Schiaparelli.—On Hoffmannite, by M. Bechi.

PARIS

Academy of Sciences, June 10.—M. Fizeau in the chair.—The following among other papers were read :—On the results

furnished by chronometers having springs with theoretical terminal curves, at the prize competition of 1877, at Neuchâtel Observatory, by M. Phillips. Of the 220 chronometers sent in 186 had springs with theoretical curves. M. Granjean's occupied the first place for their remarkable accuracy.—On the gemmiparous and fissiparous reproduction of Noctiluæ (*Noctiluca miliaris*, Suriray), by M. Robin. The processes are detailed, and several new facts communicated.—On the conservation of old types of ships, by Admiral Paris. The author's project is to reproduce figures of ancient ships from all parts of the world; he has written to the naval authorities in many countries to send drawings, with explanatory data. Some of his plates are exhibited in the Champ de Mars.—Functions of leaves in the phenomenon of gaseous exchanges between plants and the atmosphere; rôle of stomates in the functions of leaves, by M. Merget. His conclusion, from experiments, is thus stated :—In aerial and aquatic-aerial plants, oxygen, nitrogen, and carbonic acid are exchanged normally between the interior and the exterior atmosphere by way of the stomatic orifices. These exchanges may be produced by simple diffusion; they are promoted by all causes capable of producing a rupture of equilibrium between the two atmospheres, and in the double gaseous circulation which follows, the two movements of entrance and exit are performed with equal facility.—Observation of the transit of Mercury at Paita, by Admiral Serres. The conditions were highly favourable, and 600 daguerrotypes were obtained. Each officer made an independent report.—Researches on the sub-nitrate of bismuth, by M. Riche. The mechanism of the action of this substance in the system is controverted. It is important that the druggist should supply for it always the same product, and that the sub-nitrate be exclusively prepared with water slightly calcareous according to the formula of Codex. Every product should be rejected which contains less than 12 to 13 per cent. of nitric acid.—On the physiological rôle of hypophosphites, by MM. Paquetin and Soly. They are shown to be not reconstituents but diuretics.—On the colouring matter of wines, by M. Gautier. Each stock produces one or several special colouring matters, and the principles of these substances together form a family of similar but not identical substances of the aromatic series, having the rôle of acids, partly combined in the wines under the form of ferrous salt, and apparently resulting from oxidation of the corresponding tannins. He describes the colouring matter of two stocks.

CONTENTS

	PAGE
HENFREY'S BOTANY. By ALFRED W. BENNETT, F.L.S.	217
PAYEN'S INDUSTRIAL CHEMISTRY	218
OUR BOOK SHELF :—	
"Annual Report of the Superintendent of Government Farms."—	
R. WARINGTON	219
LETTERS TO THE EDITOR :—	
The Size of the Indian Tiger.—Sir J. FAYRER, F.R.S.	219
Zoological Geography.—SEARLES V. WOOD, Jun.	220
Time and Longitude.—REV. S. J. WHITMEER	220
New Lunar Crater.—EDWARD GREENHOW	220
Opening of Museums on Sundays.—Prof. W. H. CORFIELD,	
Chairman of the Committee of the Sunday Society	220
Ophrys muscifera.—HERMANN MÜLLER	221
The Jura.—MARSHALL HALL	221
THE TRANSIT OF VENUS PHOTOGRAPHS. By Capt. TUPMAN	221
THE NORWEGIAN NORTH ATLANTIC EXPEDITION	222
PHYSICAL SCIENCE FOR ARTISTS, VI. By J. NORMAN LOCKYER, F.R.S.	223
AN ECLIPSE SPECTROSCOPE. By J. NORMAN LOCKYER, F.R.S. (With Illustration)	224
OUR ASTRONOMICAL COLUMN :—	
Nearest Approximations of Small Planets to the Earth's Orbit	225
Measures of Double Stars	225
The Binary Star α Centauri	225
BIOLOGICAL NOTES :—	
Decorative Colouring in Freshwater Fleas	226
How Lepidoptera Escape from their Cocoons (With Illustration)	226
Fear of Snakes in Primates	227
The Fertilisation of Eggs of the Lamprey	227
GEOGRAPHICAL NOTES	227
REAL BROWN BREAD. By Prof. A. H. CHURCH (With Illustration)	229
THE LAND OF BOLIVAR AND ITS PRODUCTS (With Illustrations)	230
THE FISHERIES OF BRITISH NORTH AMERICA, II. By Dr. WILLIAM B. CARPENTER, F.R.S.	232
THE GEOLOGY OF LONDON	235
NOTES	236
ON THE PHYSICAL ACTION OF THE MICROPHONE. By Prof. HUGHES	239
LABORATORY NOTES. By Prof. JOHN G. MCKENDRICK	240
VOLCANIC PHENOMENA AND EARTHQUAKES DURING 1877	241
UNIVERSITY AND EDUCATIONAL INTELLIGENCE	241
SCIENTIFIC SERIALS	242
SOCIETIES AND ACADEMIES	242